Claims

1. A semiconductor laser device which emits a plurality of laser lights having different wavelengths, said device comprising:

a first laser oscillation section laminated on a semiconductor substrate; and

a second laser oscillation section which oscillates at a wavelength different from the first laser oscillation section;

wherein the first laser oscillation section's one surface located away from the semiconductor substrate and the second laser oscillation section's one surface located close to its light emitting portion are bonded together by virtue of insulating adhesive layers;

said semiconductor laser device further comprises:

first and second ohmic electrode layers formed on the surfaces of waveguides of the first and second laser oscillation sections; and

first and second wiring layers formed between the first and second laser oscillation sections, electrically and individually connected with the first and second ohmic electrode layers.

2. The semiconductor laser device according to claim 1, wherein the first laser oscillation section or the semiconductor substrate is partially protruding when viewed from the second laser oscillation section side, with the first and second wiring layers extending on the surface of the protruding portion.

3. The semiconductor laser device according to claim 1 or 2,

wherein the adhesive layers are SOG (spin on glass).

4. The semiconductor laser device according to any one of claims 1 to 3, wherein an insulating layer consisting of a material different from the adhesive layers is formed between the first wiring layer and the first laser oscillation section expect an area of the ohmic electrode layer.

5. The semiconductor laser device according to any one of claims 1 to 4, wherein:

the semiconductor substrate consists of III-V compound semiconductor;

the first laser oscillation section includes III-V compound semiconductor or II-VI compound semiconductor containing arsenic (As), phosphorus (P) or antimony (Sb) as group V element,

the second laser oscillation section includes nitride based III-V compound semiconductor containing nitrogen (N) as group V element.

6. The semiconductor laser device according to any one of claims 1 to 4, wherein:

the first laser oscillation section includes nitride based III-V compound semiconductor containing nitrogen (N) as group V element,

the second laser oscillation section includes III-V compound semiconductor or II-VI compound semiconductor containing arsenic (As), phosphorus (P) or antimony (Sb) as group V element.

7. A method of manufacturing a semiconductor laser device which emits a plurality of laser lights having different wavelengths, said method comprising the steps of:

forming a first film layer containing at least an active layer and waveguides on a semiconductor substrate to produce a first intermediate body;

forming a second film layer containing at least an active layer and waveguides on a support substrate to produce a second intermediate body;

causing the waveguides of the first and second intermediate bodies to face each other and bonding together the first and second intermediate bodies by virtue of insulating adhesive layers; and

removing the support substrate to expose the second film layer.

8. The method according to claim 7, wherein

in the step of producing the first intermediate body, first ohmic electrode layers along the waveguides of the first film layer, a first wiring layer electrically connected with the first ohmic electrode layers, first insulating adhesive layers covering predetermined areas including the waveguides, and a second wiring layer are formed and thus laminated on the first film layer's one surface having the waveguides;

in the step of producing the second intermediate body, second ohmic electrode layers along the waveguides of the second film layer are formed on the second film layer's one surface having the waveguides, and second insulating adhesive layers are formed in areas not

including the second ohmic electrode layers,

in the step of fixing together the first and second intermediate bodies by virtue of insulating adhesive layers, the second wiring layer and the second ohmic electrode layers are electrically connected with each other so as to tightly bond together the first and second insulating adhesive layers, thereby fixing together the first and second intermediate bodies by virtue of the insulating adhesive layers.

9. The method according to claim 7 or 8, wherein the adhesive layers are SOG (spin on glass).

10. The method according to any one of claims 7 to 9, wherein

the semiconductor substrate consists of III-V compound semiconductor;

the first film layer includes III-V compound semiconductor or II-VI compound semiconductor containing arsenic (As), phosphorus (P) or antimony (Sb) as group V element,

the second film layer includes nitride based III-V compound semiconductor containing nitrogen (N) as group V element.

11. The method according to claim 10, wherein

the support substrate is a sapphire substrate or an AlN substrate,

in the step of exposing the second film layer, a light is applied from the backside of the support substrate to an area adjacent to the junction between the support substrate and the second film layer,

so as to heat and thus decompose the area near the junction.

12. The method according to claim 11, wherein said light has a wavelength of 360 nm or less.

13. A method of manufacturing a semiconductor laser device which emits a plurality of laser lights having different wavelengths, said method comprising the steps of:

forming a first film layer containing at least an active layer and waveguides on a first semiconductor substrate to produce a first intermediate body;

forming a second film layer containing at least an active layer and waveguides on a second semiconductor substrate to produce a second intermediate body;

causing the waveguides of the first and second intermediate bodies to face each other and bonding together the first and second intermediate bodies by virtue of insulating adhesive layers; and

removing the second semiconductor substrate to expose the second film layer.

14. The method according to claim 13, wherein

in the step of producing the first intermediate body, first ohmic electrode layers along the waveguides of the first film layer, a first wiring layer electrically connected with the first ohmic electrode layers, and first adhesive layers are formed and thus laminated on the first film layer's one surface having the waveguides;

in the step of producing the second intermediate body, second

ohmic electrode layers along the waveguides of the second film layer, a second wiring layer electrically connected with the second ohmic electrode layers, and second adhesive layers are formed and thus laminated on the second film layer's one surface having the waveguides,

in the step of fixing together the first and second intermediate bodies by virtue of the adhesive layers, the first and second adhesive layers are tightly bonded together so as to bond together the first and second intermediate bodies.

15. The method according to claim 14, wherein in the step of producing the first intermediate body, insulating layers covering areas not including the first ohmic electrode layers and formed of a material different from the adhesive layers are formed on the first film layer's one surface having the waveguides, followed by forming, on the insulating layers, the first wiring layer electrically connected with the first ohmic electrode layers.

16. The method according to claim 15, wherein subsequent to the step of removing the second semiconductor substrate to expose the second film layer, the second film layer and the adhesive layers are partially etched to partially expose the wiring layer and the insulating layer.

17. The method according to any one of claims 13 to 16, wherein said adhesive layer is SOG (spin on glass).

18. The method according to any one of claims 13 to 17, wherein:

the first semiconductor substrate consists of nitride based III-V compound semiconductor containing nitrogen (N) as group V element,

the first film layer consists of nitride based III-V compound semiconductor containing nitrogen (N) as group V element,

the second semiconductor substrate consists of III-V compound semiconductor,

the second film layer includes III-V compound semiconductor or II-VI compound semiconductor containing arsenic (As), phosphorus (P) or antimony (Sb) as group V element.